

# *Increased social anhedonia and reduced helping behaviour in young people with high depressive symptomatology*

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Setterfield, M., Walsh, M., Frey, A.-L. and McCabe, C. (2016) Increased social anhedonia and reduced helping behaviour in young people with high depressive symptomatology. *Journal of Affective Disorders*, 205. pp. 372-377. ISSN 0165-0327 doi: <https://doi.org/10.1016/j.jad.2016.08.020> Available at <https://centaur.reading.ac.uk/66437/>

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To link to this article DOI: <http://dx.doi.org/10.1016/j.jad.2016.08.020>

Publisher: Elsevier

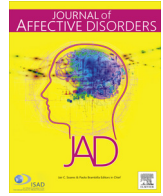
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## Research paper

## Increased social anhedonia and reduced helping behaviour in young people with high depressive symptomatology



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## ARTICLE INFO

## Article history:

Received 17 May 2016

Received in revised form

13 July 2016

Accepted 14 August 2016

Available online 16 August 2016

## Keywords:

Social reward

Helping behaviour

Anhedonia

Emotion

Depression

## ABSTRACT

**Background:** Social anhedonia, the decreased enjoyment of pleasant social experiences, is associated with depression. However, whether social anhedonia in depression affects prosocial behaviours is unclear. The current study aimed to examine how high levels of depressive symptomatology in young people affect responses to usually rewarding social situations, including helping behaviour.

**Methods:** We recruited 46 females, 16 scoring high on the Beck Depression Inventory (BDI scores > 20,  $M_{age}=19$ ; HD) and 30 scoring low (BDI < 10,  $M_{age}=20$ ; LD). In a social emotion task (SET), participants were presented with social scenarios and asked to rate their expected emotional responses. Subsequently, participants' helping behaviour was measured by dropping a pile of papers near them and recording their responses. Lastly, participants completed the SET again.

**Results:** The SET at time 1 revealed that HD individuals reported significantly stronger negative ( $p < .001$ ) and weaker positive ( $p < .05$ ) emotional responses to social situations than LD subjects. Additionally, all participants showed a significant increase in positive responses ( $p < .05$ ) on the SET between time 1 and time 2. Moreover, HD subjects were less likely to engage in actual helping behaviour than LD participants.

**Limitations:** Limitations of the study are that only females were tested and that no psychiatric screening interview was conducted.

**Conclusions:** Our results indicate that young females with high levels of depression symptoms expect to respond less positively to social situations and engage less in helping behaviour compared to those with low depressive symptomatology. Social anhedonia in depression may thus contribute to decreased engagement in rewarding social situations. This, in turn, may lead to social withdrawal and might maintain depression symptoms through a lack of exposure to positive social feedback.

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## 1. Introduction

Anhedonia, the loss of interest and pleasure in usually enjoyable experiences, is an important symptom in the diagnosis of acute major depressive disorder (MDD) and is related to abnormalities in the processing of rewarding information (McCabe et al., 2012; Henriques et al., 1994; Sloan et al., 1997, 2001; Kaviani et al., 2004; Rottenberg et al., 2002).

Social anhedonia, the decreased enjoyment and interest in pleasant social interactions, may be especially problematic in depression, because the lack of pleasure derived from social experiences may lead to social withdrawal (Rubin and Burgess, 2001). This, in turn, prevents the exposure to future positive social feedback and may, therefore, induce and maintain depressive symptomatology (Rubin et al., 2009).

Previous research has shown that depressed patients demonstrate higher social anhedonia scores than healthy controls (Olsen et al., 2015), and subjects with high social anhedonia scores experience more frequent (Blanchard et al., 2009) and more severe (Kwapil, 1998; Rey et al., 2009) episodes of depression than individuals with low social anhedonia scores. Furthermore, MDD patients and those at risk of depression have been found to display abnormalities in the processing of positive social cues, such as smiling faces, both on the behavioural (Frey et al., 2015) and the neural (Lawrence et al., 2004) level.

A question that has yet to be addressed is whether social anhedonia might also influence prosocial behaviours. It is widely accepted that people take pleasure in helping others (Cialdini, 1991; Cialdini and Fultz, 1990), and that this pleasure may be one of the main motivating factors to engage in helping behaviour (Carlson et al., 1988). Previous research has shown that helping behaviour increases happiness (Steger and Kashdan, 2006) and life satisfaction (Meier and Stutzer, 2008), which seems to be a protective factor against developing depression (Piliavin and Callero,

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1991; Gebauer et al., 2008). Moreover, it has been found that feeling rewarded by prosocial actions increases future engagement in helping behaviours (Piliavin, 2003). It may thus be predicted that social anhedonia reduces helping behaviour, because it diminishes the pleasure that is ordinarily derived from engaging in prosocial actions.

The current study aimed to assess this hypothesis by examining the relation between social anhedonia and helping behaviour in young people with high levels of depressive symptomatology. Specifically, we measured participants' anticipated emotional responses to social situations in a social emotion task (SET) and their actual helping behaviour when the researchers dropped a pile of papers near them. Before dropping the papers, we presented participants with a prosocial video which reinforced the idea that helping is rewarding. We predicted that young people with high depressive symptomatology would report reduced positive responses to social situations in the SET and would be less likely to engage in helping behaviour compared to young people with low levels of depression symptoms. Moreover, we hypothesised that lower positive responses on the SET, and thus higher social anhedonia, would predict a reduced likelihood of helping the researchers to pick up the dropped papers.

## 2. Methods

### 2.1. Participants

A sample of 99 psychology undergraduates was recruited using the online research management system SONA. Participants completed the Beck Depression Inventory (BDI; Beck, 1961) and were included if they received a score below 10 (low levels of depression symptoms, LD) or above 20 (high levels of depression symptoms, HD). To ensure that our sample did not include individuals with severe depression, we excluded participants who scored above 35 on the BDI. The final sample included in the study consisted of 30 female LD subjects ( $M_{\text{age}} = 20$  years) and 16 female HD ( $M_{\text{age}} = 19$  years) participants. In exchange for their participation, subjects received course credit.

Ethical approval for the study was obtained from the University of Reading Research Ethics Committee and all subjects provided written informed consent before their participation.

### 2.2. Materials

As part of the study, participants completed the Beck Depression Inventory (BDI; Beck, 1961) online, and the Revised Social Anhedonia Scale (RSAS; Eckblad et al., 1982) as well as the Revised Physical Anhedonia Scale (RPhA; Eckblad et al., 1982) on paper.

The BDI is a self-report measure used to assess depressive symptoms. It consists of 21 items requiring individuals to rate their feelings over the previous two weeks. It shows sound psychometric properties in both clinical (Richter et al., 1998; Basker et al., 2007; Wang and Gorenstein, 2013) and non-clinical (Wang and Gorenstein, 2013) populations. For each of the 21 items, four response options are provided which are ordered from most positive (e.g. I do not feel sad) to most negative (e.g. I am so sad and unhappy that I can't stand it), and participants are asked to indicate which option best applies to them. The options are associated with scores from zero (most positive) to three (most negative), and to obtain the final BDI score the values of all chosen options are totalled. Thus, the minimum and maximum BDI scores are 0 and 63, respectively.

The RSAS and RPhA are self-report measures which are widely used in the assessment of anhedonia, displaying good psychometric properties in clinical (Gooding et al., 2005) and non-clinical

(Fonseca-Pedrero et al., 2009) populations. The questionnaires consist of 40 and 61 statements referring to socially or physically pleasant scenarios, respectively, and require participants to choose whether the statements are true or false for them. Questions on which participants choose the option that is indicative of anhedonia, e.g. answering 'true' in response to the item 'having close friends is not as important as people say' (RSAS), are given a score of 1. Otherwise responses receive a score of 0. Higher scores on these questionnaires reflected increased anhedonia, with scores  $\geq 12$  on the RSAS and  $\geq 18$  on the RPhA considered to indicate high levels of anhedonia.

Participants also watched a 4.36-minute-long video on a laptop, which showed people engaging in prosocial behaviours towards strangers. Examples of scenarios shown in the video include assisting someone who has fallen over to stand up, helping the elderly to rake leaves, holding a door open for someone, and indicating to a child that it has dropped a toy. In the background of the video a song was played which repeated the lyrics 'if you give a little love, you can get a little love of your own'.

Participants' own helping behaviour was videotaped during the staged paper dropping incident using a camera (Canon IXUS 275 HS) which was hidden behind objects in the testing room.

All data collected during the study was analysed using SPSS (version 22.0).

### 2.3. Procedure

#### 2.3.1. General procedure

After having completed the BDI online, eligible participants who scored below 10 or above 20 on the BDI were asked to attend a testing session. Subjects were tested individually. During the session, they filled in the RSAS and RPhA questionnaires and performed the social emotion task (SET). Subsequently, participants watched a prosocial video and were then assessed regarding their helping behaviour. Finally, subjects completed the SET a second time before being debriefed. During the debriefing, participants were asked if they agreed to their video recording being used as part of the study's analysis. If participants did not provide consent, their recording was deleted.

#### 2.3.2. Helping behaviour assessment

After participants finished watching the prosocial video, the researcher walked past carrying a pile of papers which were dropped at a specific location near the subjects. Although intentional, the dropping of the papers was made to appear accidental and was meant to elicit participants' helping behaviour. Unbeknownst to the participants, their responses were videotaped and the number of papers individuals retrieved and their latency to help was assessed. The assessor was blind to the BDI scores of the participants. A similar paper dropping incident has previously been used to examine helping behaviour (Isen and Levin, 1972).

#### 2.3.3. Social emotion task (SET) procedure

The SET consisted of 24 unfinished sentences which related to social situations and were created by the researchers. For example, the following sentences were included: 'When I have a meal with my friends, I feel...', 'When someone smiles at me, I feel...', and 'When I am invited to a friend's party, I feel...'. For each sentence, six completion options (e.g. happy, eager to socialise, annoyed, anxious, etc.) were provided which described the pleasure, motivation and achievement feelings subjects might experience in the outlined social scenario. Participants were instructed to use a ten-point Likert scale to rate each of the six completion options based on their expected feelings in the described social situation (see Fig. 1).



Fig. 1. Extract from the sentence completion task.

## 2.4. Analysis

Group differences in questionnaire and demographic data were assessed using a one-way analysis of variance (ANOVA).

Helping behaviour was assessed by classifying participants into helpers and non-helpers based on the researchers' observations and the video recording. Subjects who retrieved at least one dropped paper, either by leaning from their chair, physically leaving their chair or after a period of hesitation, were categorised as helpers. Those who retrieved no papers were classified as non-helpers. Participants were denoted as having hesitated if they appeared to want to help by leaning towards the papers within 2 s after the papers had been dropped, but refrained from helping for at least 4 s as measured by the video recording. Chi-square tests were used to assess whether there was an association between depressive symptomatology (high or low) and helping behaviour (helpers or non-helpers), and correlations between questionnaire scores and latency to help were examined using Pearson's correlation analyses.

The items on the SET were initially scored in such a way that lower scores indicated higher positive or negative emotional responses. To make the interpretation of the results more intuitive, the scores were reversed. Thus, in the below analysis high scores indicate high levels of a given emotional response. For each participant, an average was calculated for ratings of items on which the non-negated response option was positive (e.g. happy, eager to socialise, etc.) and, separately, for ratings of items on which the non-negated response option was negative (e.g. annoyed, anxious, etc.). Below, the resulting averages are referred to as positive and negative emotion ratings, respectively, and reflect the extent to which participants expected to respond positively or negatively to the described social situations.

To examine SET performance, a three-way mixed measures ANOVA was conducted with the between-subjects factor of

depressive symptomatology (high or low) and the within-subjects factors of valence (negative or positive emotional responses) and time (performance before and after the elicitation of the helping behaviour; time 1 and time 2, respectively).

Furthermore, to assess whether social anhedonia, as measured by the SET, predicted helping status (i.e. being a helper or a non-helper), a logistic regression was conducted. As the main variable of interest, positive SET ratings at time 1 were entered into the regression model first. Subsequently, BDI scores were added to the model to assess whether there was a predictive relation between social anhedonia and helping status even when depression scores were controlled for. Finally, correlation analyses between SET ratings and questionnaire measures were conducted.

## 3. Results

### 3.1. Demographic and questionnaire measures

A one-way ANOVA between depression groups revealed that there were no significant differences in age ( $F(1,45)=.54, p=.466$ ), whereas BDI ( $F(1,45)=276.30, p<.001$ ), RSAS ( $F(1,45)=35.58, p<.001$ ), and RPhA ( $F(1,45)=14.84, p<.001$ ) scores were significantly higher for participants with high (HD) than for those with low levels of depression symptoms (LD; see Table 1).

### 3.2. Helping behaviour

A Pearson's chi-square test revealed a significant association between subjects' depression levels (high or low) and their helping behaviour (helpers or non-helpers),  $\chi^2(1)=12.53, p<.001$ . More specifically, 73.3% of LD participants helped, while only 18.8% of HD participants did.

To further break down this finding, the frequencies of the different manifestations of the helping behaviour were examined. It was found that of the LD helpers, the majority (49%) lent over, not leaving their chair when retrieving papers, whilst 12% actually left their chair (see Fig. 2a). No participants in the HD group lent over or left their chair to help (see Fig. 2b).

### 3.3. Correlations between questionnaire scores and helping behaviour measures

To assess the relationship between BDI, RSAS and RPhA scores and participants' latency to help, Pearson's correlation analyses were performed. Non-helpers were removed from the analysis since, for obvious reasons, there was no 'latency to help' data available for them. Given that only very few HD participants were helpers, conducting a correlation analysis within this group would not have been valid. Therefore, the correlation was restricted to helpers in the LD group. The analysis revealed a significant positive correlation

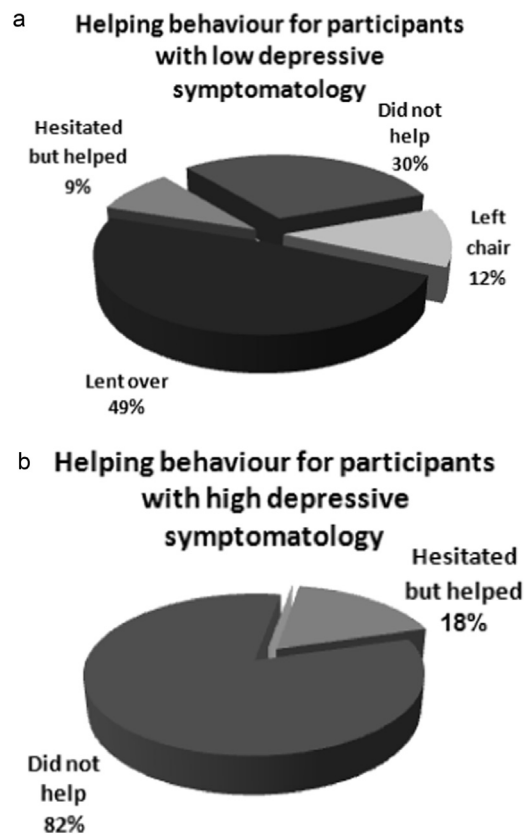
Table 1

Demographic data and questionnaire scores for individuals with high and low depressive symptomatology.

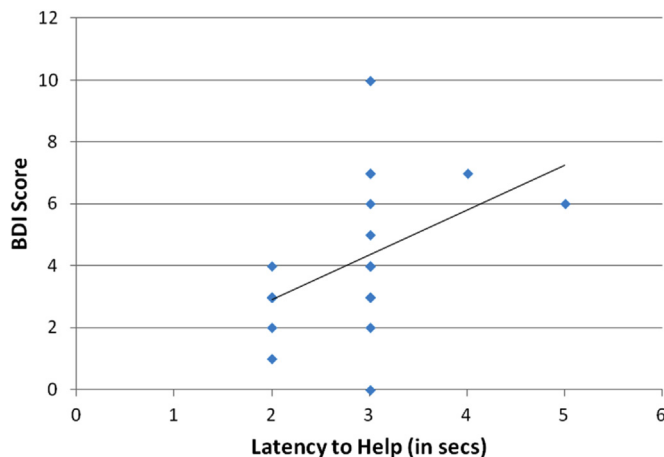
	HD (N=16)		LD (N=30)	
	Mean	SD	Mean	SD
Age (years)	19.19	1.22	20.20	5.41
BDI	24.81	5.08	5.47	2.85
RSAS	15.19	8.12	4.60	3.63
RPhA	13.94	9.32	6.63	3.46

HD, high depressive symptomatology; LD, low depressive symptomatology; SD, standard deviation; BDI, Beck Depression Inventory; RSAS, Revised Social Anhedonia Scale; RPhA, Revised Physical Anhedonia Scale.





**Fig. 2.** (a) Kinds of helping behaviour for participants with low levels of depression symptoms. (b) Kinds of helping behaviour for participants with high levels of depression symptoms.



**Fig. 3.** Correlation between BDI scores and latency to help for participants with low depressive symptomatology.

between BDI scores and latency,  $r=.54$ ,  $n=22$ ,  $p=.010$  (see Fig. 3), while there was no significant correlation between RPhA scores and latency,  $r=.16$ ,  $n=22$ ,  $p=.487$ , or between RSAS scores and latency,  $r=.21$ ,  $n=22$ ,  $p=.349$ . These results imply that latency to help is significantly related to depression symptomatology.

#### 3.4. SET ratings

The three-way mixed measures ANOVA (time  $\times$  valence  $\times$  depression group) revealed no significant main effect of group ( $F(1,44)=.28$ ,  $p=.601$ ,  $\eta_p^2=.010$ ) or valence ( $F(1,44)=.65$ ,  $p=.423$ ,  $\eta_p^2=.015$ ). However, there was a significant main effect of time ( $F(1,44)=11.25$ ,  $p=.002$ ,  $\eta_p^2=.204$ ), in that emotion ratings were significantly higher at time 2 ( $M=6.70$ ,  $SD=.57$ ) than at time 1 ( $M=6.52$ ,  $SD=.54$ ). This effect was driven by differences in positive emotion ratings between time points (see paired-samples  $t$ -test results below).

Additionally, significant valence by group ( $F(1,44)=20.64$ ,  $p<.001$ ,  $\eta_p^2=.319$ ) and time by valence ( $F(1,44)=14.34$ ,  $p<.001$ ,  $\eta_p^2=.246$ ) interactions were observed. Two independent-samples  $t$ -tests were conducted to assess group differences between the valences independent of time point. It was found that negative emotions were rated significantly higher by HD participants ( $M=6.97$ ,  $SD=.84$ ) than by LD individuals ( $M=6.03$ ,  $SD=.80$ );  $t(44)=-3.77$ ,  $p<.001$ . By contrast, positive emotions were rated significantly lower by HD ( $M=6.12$ ,  $SD=1.48$ ) than by LD ( $M=7.24$ ,  $SD=.60$ ) subjects;  $t(17.70)=2.90$ ,  $p=.010$ .

The significant time by valence interaction was followed up with two separate paired-samples  $t$ -tests for positive and negative emotions. The analysis revealed that positive emotions were rated significantly higher at time 2 ( $M=7.07$ ,  $SD=1.16$ ) than at time 1 ( $M=6.64$ ,  $SD=1.15$ );  $t(45)=5.60$ ,  $p<.001$ , whereas the ratings of negative emotions did not differ significantly between time points;  $t(45)=.79$ ,  $p=.436$ .

The time by group ( $F(1,44)=.81$ ,  $p=.373$ ,  $\eta_p^2=.018$ ) and time by valence by group ( $F(1,44)=3.09$ ,  $p=.086$ ,  $\eta_p^2=.066$ ) interactions were not significant.

#### 3.5. Relation between helping behaviour and social anhedonia measured by the SET

A logistic regression, used due to the categorical outcome variable, indicated that positive emotion ratings at time 1 predicted helping behaviour status (helper or non-helper), Nagelkerke  $R^2=.15$ ,  $X^2(1)=5.32$ ,  $p=.021$ . An increase in positive emotion ratings was associated with an increase in the probability of being a helper,  $B=.72$ ,  $SE=.36$ , Wald (1)=3.93,  $p=.047$ . However, once BDI scores were entered into the model, positive emotion ratings ( $B=-.21$ ,  $SE=.47$ , Wald (1)=.20,  $p=.654$ ) no longer significantly contributed to predicting helping behaviour while BDI scores did ( $B=-.22$ ,  $SE=.07$ , Wald (1)=10.65,  $p=.001$ ;  $R^2=.56$ ,  $X^2(2)=24.75$ ,  $p<.001$ ).

#### 3.6. Correlations between questionnaires and SET measures

Pearson's correlation analyses were performed separately for the two depression groups to determine whether participants' questionnaire scores were associated with their ratings of positive and negative emotions on the SET at time 1. The analysis revealed that for the LD group positive emotion ratings were significantly negatively correlated with RSAS and RPhA scores but not with BDI scores. Thus, participants who expected to respond less positively to social situations in the SET had higher anhedonia scores. However, there were no significant correlations between negative emotion ratings and any of the questionnaire measures for LD participants.

For the HD group, positive emotion ratings were significantly negatively correlated with RSAS and RPhA scores and negative emotion ratings were positively correlated with RSAS and RPhA scores. That is to say, subjects who anticipated responding less positively or more negatively to social scenarios in the SET had higher anhedonia scores. Neither positive nor negative emotion ratings were significantly correlated with BDI scores within the HD group (see Table 2).

#### 4. Discussion

The current study aimed to examine social anhedonia and helping behaviour, as well as the relation between the two, in

**Table 2**

Correlations between questionnaires and SET measures (positive and negative emotion ratings) for individuals with high and low depressive symptomatology.

	HD (N=16)						LD (N=30)					
	Positive			Negative			Positive			Negative		
	r	n	p	r	n	p	r	n	p	r	n	p
BDI	-.34	16	.198	.10	16	.707	-.21	30	.273	.05	30	.802
RSAS	-.74	16	.001	.51	16	.043	-.42	30	.020	.19	30	.307
RPhA	-.72	16	.002	.61	16	.012	-.62	30	<.001	.30	30	.106

HD, high depressive symptomatology; LD, low depressive symptomatology; BDI, Beck Depression Inventory; RSAS, Revised Social Anhedonia Scale; RPhA, Revised Physical Anhedonia Scale.

individuals with high (HD) and low (LD) depressive symptomatology.

As expected, we found that HD participants displayed higher levels of social anhedonia on the Revised Social Anhedonia Scale (RSAS) compared to LD subjects. This finding is in line with previous studies reporting higher social anhedonia in MDD patients than in controls (Olsen et al., 2015) and an association between increased RSAS scores and more severe depressive symptoms (Kwapil, 1998; Rey et al., 2009).

#### 4.1. Helping behaviour

With regards to helping behaviour we found that HD participants were less likely to help the researcher to pick up dropped papers than LD subjects, and the higher the BDI scores the longer it took LD participants to initiate the helping behaviour. Moreover, reporting lower expected positive emotional responses to social scenarios was associated with having a decreased probability of helping the researcher.

Our results suggest that HD individuals are less motivated to help others than LD subjects, possibly because they expect to derive less pleasure from prosocial actions due to their increased social anhedonic tendencies. However, we found that once BDI depression scores were controlled for, the SET responses no longer predicted helping behaviour, while BDI scores did. This is to be expected, as other depression symptoms, alongside social anhedonia, are likely to play a role in the reduced helping behaviour observed in our HD sample.

#### 4.2. Anticipatory social anhedonia

The social emotion task revealed that HD participants expected to experience weaker positive and stronger negative emotions in response to social situations than LD individuals. Additionally, as positive SET emotion ratings decreased, RSAS anhedonia scores increased in both groups, which suggests that the SET successfully measures anhedonic tendencies.

The SET can be said to measure anticipatory (social) anhedonia, because participants were instructed to indicate what emotional responses they *anticipate* to experience in the described social scenarios. Thus, the current findings are in line with previous research reporting that individuals with depression demonstrate higher anticipatory anhedonia than controls (Sherdell et al., 2012), and that higher BDI scores predict lower anticipatory responses to food rewards (Chentsova-Dutton and Hanley, 2010). The current study extends these observations to social stimuli.

Interestingly, it has previously been observed that higher anticipatory anhedonia is associated with decreased motivation to exert effort to obtain rewards (Sherdell et al., 2012). Based on these findings, together with the current results, it may thus be

expected that individuals with high depressive symptomatology may be less motivated to engage in social interactions because they anticipate deriving less pleasure from them. This may lead to social withdrawal (Rubin and Burgess, 2001), which, in turn, prevents the exposure to future positive social feedback and may, therefore, induce and maintain depressive symptomatology (Rubin et al., 2009).

Consequently, exposing individuals with high depressive symptomatology to positive social experiences, e.g. as part of behavioural activation therapy (Lejuez et al., 2001), may potentially be beneficial in decreasing social anhedonia as well as other depression symptoms that are maintained by social withdrawal. Partly in line with this suggestion, the present study found that participants reported stronger positive emotional responses to social situations after, compared to before, they were given the opportunity to engage in potentially rewarding helping behaviour.

It would be interesting for future studies to investigate if similar patterns of increased social anhedonia and decreased helping behaviour are found in individuals at risk of depression, such as those with a family history of MDD. If this were the case, social anhedonia and the associated diminished engagement in positive social interactions may not only contribute to the maintenance but also to the onset of depression.

### 5. Limitations

It should be mentioned that no psychiatric screening interview was conducted as part of the current study. Therefore, we cannot rule out the possibility that our participants may have had symptoms of other psychiatric disorders associated with decreased prosocial behaviour or social anhedonia (e.g. schizophrenia). However, the fact that BDI scores were significantly positively correlated with LD participants' latency to help supports the idea that depressive symptomatology seems to be associated with changes in helping behaviour. Whether this observation is specific to MDD or also applies to depressive symptomatology that occurs as part of other disorders needs further investigation.

Furthermore, considering that only females were tested we cannot generalise our findings to males. However, as more females are diagnosed with depression than males (Nolen-Hoeksema, 2001), we think the results of the present study are an important first step suggesting that it may be beneficial to conduct follow-up studies examining social anhedonia and helping behaviour in both males and females.

### 6. Conclusion

In conclusion, our findings indicate that (female) individuals with high depressive symptomatology are less likely to engage in helping behaviour and anticipate responding less positively to social situations than controls. This suggests that a lack of expected enjoyment and engagement in social situations may contribute to the maintenance of depression symptomatology. Thus, increasing positive social experiences in young people with depression symptomatology may reduce depression severity and may potentially even prevent clinical MDD onset.

### Conflict of interest statement

Dr. McCabe has acted as a consultant to Givaudan, GWpharma, the British Broadcasting Company (BBC) and Channel 4. Megan Setterfield, Mallory Walsh, and Anna-Lena Frey report no biomedical financial interests or potential conflicts of interest.

## Funding

This work was funded by the University of Reading.

## Acknowledgements

The research was funded by the University of Reading.

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